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(54) **System for data field area acquisition in IC card for multiple services.**

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FR-A- 2 473 755

(73) Proprietor: **FUJITSU LIMITED**
1015, Kamikodanaka
Nakahara-ku
Kawasaki-shi Kanagawa 211(JP)

(72) Inventor: **Ogasawara, Nobuo**
688-11, Suenaga
Takatsu-ku
Kawasaki-shi Kanagawa 213(JP)

(74) Representative: **Joly, Jean-Jacques et al**
Cabinet Beau de Loménie
158, rue de l'Université
F-75340 Paris Cédex 07 (FR)

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a system for acquiring a data field in an integrated circuit card (IC card) for multiple services. The system according to the present invention discriminates whether or not a service for which a data field area is acquired is provided by an authorized source, and controls the acquisition of the data field area within an allowable range.

2. Description of the Related Art

In an IC card for multiple services, all the services to be provided are not always determined upon card issuance. The IC card often has vacant areas. When the IC card has vacant areas, some services may be additionally provided to the vacant areas in the card after card issuance.

The source which additionally provides a service must not be an arbitrary third party, but one of several limited companies, organizations, company groups, organization groups, or the like. Also, the data field area used must be limited. If a given service supplier is allowed to use any size of area, another would find it difficult to additionally provide a service. Therefore, it is desired that each service supplier be allowed to use only up to a predetermined size of area.

In a conventional system for acquiring a data field area, the data field area is additionally acquired based on the area size demand input from a terminal apparatus to an IC card and the data field information already formed in the IC card. Examples of such a system can be found in the publication "Smart Cards, The New Bank Cards" by Jerome Svigals, published by MacMillan Publishing Company, 1985, 1987, and document ISO/TC68/SC6/WG7 issued by INTAMIC on behalf of BSI

In the conventional system, data field formation demand input from a terminal apparatus can be accepted regardless of the demander, and the data field area, corresponding to the demanded area size is acquired in so far as there is a vacant data field area in the IC card. In the conventional system, therefore, there are problems that, if only a former of a data field obtains a right and approval for forming an area, a data field may be formed in the IC card by an unauthorized source, or the data field area in the IC card may be exclusively occupied by a specific service supplier, and there may be a disadvantage that, if an attempt is made to add an additional service to the IC card, there is no area vacant for such an additional service.

Another example of an IC memory card system specially adapted for confidential data is disclosed in FR-A-2 473 755. The memory of this prior art is divided into a zone containining an undeletable user identification code and a separate zone for storing data such as commercial transactions. The data can only be deleted by a specially authorized group of users. A comparator is provided to authorize access to the data zone only if there is correspondence between a code entered on an external device to which the card is connected and the code stored in the card.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved system for data field area acquisition wherein a plurality of area user identifications and authentication codes and usable area size data are stored in an IC card upon issuance of the IC card. A data field formation demand by a person other than an authenticated area user or a data field formation demand for an area larger than a predetermined size is rejected, so the IC card can be protected from illegal data field formation.

According to the present invention, there is provided a system for data field area acquisition in an IC card for multiple services, as defined in claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings,

Fig. 1 is a perspective view of an IC card used in a system of the present invention;

Fig. 2 is a circuit diagram when the IC card used in the system of the present invention is used;

Fig. 3 is a view showing a conventional system;

Fig. 4 is a block diagram of a system according to an embodiment of the present invention;

Fig. 5 is a flow chart showing the operation of the system shown in Fig. 4; and

Fig. 6 is a view for supplementarily explaining the system shown in Fig. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Prior to a description of a preferred embodiment of the present invention, an IC card as used both in the system of the present invention and a conventional system will be described. Figures 1 and 2 are for explaining an IC card. As shown in Fig. 1, an IC card has contacts, an integrated circuit module arranged beneath the contacts, and an area to be embossed.

Figure 2 shows a terminal apparatus electrically connected to the IC card, a program portion for requesting formation of a data field, and a transmission path through which an area user identification and an authentication code (AC code) designated by the program and an area size demand are transmitted to the IC card.

The IC card includes a CPU as a data processor, a memory, such as EPROM and/OR EEPROM, for storing input information, control information, and data fields, and a ROM for storing control programs. In addition, a plurality of metal contacts for electrically contacting an external apparatus are provided on the surface or back of the card.

Figure 3 shows an example of a conventional system for acquiring a data field area. In Fig. 3, reference numeral 13′ denotes a portion for inputting an area size demand; 81, 82, and 83, data fields already formed in an IC card; 80, an additionally acquired data field; and 4′, a portion for acquiring data field area.

In the conventional system shown in Fig. 3, a data field formation demand sent from a terminal apparatus is accepted regardless of the requester when the requester is authenticated by general authentication such as a personal identification number and an authentication code for an IC card. Thus, a data field area corresponding to an area size demand is acquired by the portion 4′ as long as the IC card has a vacant area. In this manner, a data field is additionally formed.

A system for data field area acquisition in an IC card for plural services according to an embodiment of the present invention will now be described with reference to Figs. 4 and 5. Figure 4 shows a system according to an embodiment of the present invention.

The system of Fig. 4 includes an area user identification inputting portion 11, an authentication code inputting portion 12, a portion 13 for inputting an area size demand, area user identifications 51, area user authentication codes 52, usable area sizes 53, and a storage 5 for a table for data field control, constituted by the plurality of area user identifications 51, the authentication codes 52, and the usable area sizes 53.

The system of Fig. 4 also includes memories for area user identifications 61, 62, and 63 corresponding to the data fields, area size information 71, 72, and 73 corresponding to the data fields, data fields 81, 82, and 83, an area user identification 60 corresponding to a data field 80 to be additionally acquired, an area size information 70 of the data field to be additionally acquired, and an additionally acquired data field 80.

The system of Fig. 4 further includes an area user authentication portion 2, a portion 3 for calculating a remainder area for an authenticated area user; and a portion 4 for additionally acquiring a data field area.

The operation of the system shown in Fig. 4 will now be described. The authenticating portion 2 compares an input area user identification from the portion 11 and an input authentication code from the portion 12 with a corresponding area user identification and an authentication code stored in the table storage 5. An authentication code corresponding to an area user identification in the table storage 5 which coincides with the area user identification is validated with regard to the input authentication code, thereby authenticating an area user.

When an area user is authenticated, a sum of area sizes of already formed data fields is subtracted from a corresponding usable area size in the table storage 5, thereby calculating a remainder usable area of the corresponding area user.

When the remainder usable area size is equal to or larger than the demanded area size, the data field area acquiring portion 4 is operated.

When the vacant area in the IC card is equal to or larger than the demanded area size, the data field area acquiring portion 4 acquires an area in the vacant area, and thus additionally forms a data field.

Figure 5 is a flow chart for explaining the operation of the system shown in Fig. 4.

A memory data field formation demand, a user identification, an authentication code, and an area size demand for the IC card are received from a terminal apparatus.

The CPU searches for an area user identification corresponding to the input area user identification in the table storage 5 (step S1).

When no coincident identification is found, it is determined that a demander is not an authenticated area user, and an error indication is made.

For example, a non-response state is established for an external apparatus, or information indicating that registration is not permitted is indicated as a response signal.

If a coincident identification is found, an authentication code in the table storage corresponding to the identification is validated with regard to the input authentication code (step S2).

If the validation result is noncoincidence, it is determined that a demander is not an authenticated area user, and an error indication is made. However, when coincidence is established, it is determined that a demander is an authenticated area user, and the control advances to authentication of the area size (step S3).

Area user identifications in data fields in the IC card are compared with the input area user identification so as to find a coincident data field (step S4).

Then, the CPU sums the area sizes of these data fields and derives the sum as a used area size with respect to the area user identification (step S5).

If the area has not been used, the sum is zero.

Next, the used area size is subtracted from a usable area size in the table storage corresponding to the area user identification, and the difference is compared with the input area size demand.

If the difference is smaller than the area size demand in the above comparison step, an error indication is made since a vacant area is not available (step S6).

If the difference is equal to or larger than the area size demand, the area size demand is compared with the area size of the vacant area in the IC card. If the area size demand is larger than the vacant area, an error indication is made since the vacant area is not available (step S7).

If the area size demand is equal to or smaller than the vacant area size, a new data field area is acquired from the vacant area of the IC card, an area user identification and an area size are set, and a data field is additionally formed. Thus, the processing is ended (step S8).

As the area user identification, an identification of a service supplier or that for a group of service suppliers is used.

Figure 6 is a block diagram for supplementarily explaining the system of the present invention. That is, from another point of view, the system shown in Fig. 4 can be considered as one having an arrangement shown in Fig. 6.

A unit for using a memory accesses a use area registered in a unit for registration based on a demand for processing various services supplied from a contact. A table storage stores an area size of a data field that can be assigned to a memory with respect to processing of various services, e.g., the number of bytes. The memory has a plurality of data fields. The memory has data fields corresponding to an area user who has already provided a service using this IC card or corresponding to the types of service processing.

Even if a given service is registered in advance in the table storage, if it has not been actually used yet, that is, if a card user does not wish to register the given service and does not register in a service company, no data field corresponding to the service is formed.

In a unit for permission, an area size demand of new service processing supplied from an external apparatus through the contact is compared with a usable area size read out from the information storage table. As a result of comparison, if the area size demand is equal to or smaller than the usable area size, data corresponding to an address space of a size corresponding to one of the area size demand and the usable area size, e.g., a start address and a byte length of a data field area, are stored in the unit for registration, thus permitting the subsequent use.

Claims

1. A system for data field area acquisition in an IC card for multiple services, said system comprising, at the level of the IC card :

- a memory divided into a plurality of data fields (80-83) for storing data;
- table storage means (5) for storing a plurality of area user identifications and area user authentication codes corresponding to the area user identifications;
- area user identification input means (11);
- area user authentication code input means (12);
- authentication means (2) for comparing an area user identification and an authentication code, respectively entered by said input means (11, 12), with a corresponding area user identification and an authentication code stored in said table storage means (5), to thereby determine an authentic user;

characterized in that :

said table storage means (5) further stores, upon issuance of said IC card, usable memory area size information corresponding with each area user authentication code and representing the size of area allowed to be used by the authenticated user;

and that the system further comprises:

- user area size calculating means (3) for calculating a remainder user area size for an authenticated user authenticated by said authentication means (2), on the basis of the usable area size information corresponding to said authenticated user, stored in said table storage means (5) and the used area size representing the sum of area sizes of already formed data fields with respect to the corresponding area user identification ;
- area size demand input means (13) for receiving a request for the acquisition of an area of given size in the data field corresponding to an area user identification; and
- data field area acquiring means (4) controlled by said area size calculating means (3) for acquiring and forming the demanded area in a vacant area of the IC card on condition that said demanded

data field area is of a size less than or equal to said remainder usable area size and less than or equal to the vacant area size of the IC card.

2. A system according to claim 1, wherein the area user authentication means (2) is operated by signals from the area user identification input portion, the authentication code input means, and the table storage means.

3. A system according to claim 1, wherein said area size calculating means (3) is operated by signals from the area user authentication means (2), the area size demand input means (13), the table storage means (5), and the information storage means for respective data fields.

Patentansprüche

1. System zur Datenfeldbereichserfassung in einer IC-Karte für mehrfache Dienste, welches genannte System auf der Ebene der IC-Karte umfaßt:

einen Speicher, der in eine Vielzahl von Datenfeldern (80 bis 83) geteilt ist, zum Speichern von Daten;

eine Tabellenspeichereinrichtung (5) zum Speichern einer Vielzahl von Bereichsbenutzer-Identifikationen und Bereichsbenutzer-Authentisierungscodes entsprechend den Bereichsbenutzer-Identifikationen;

eine Einrichtung (11) zum Eingeben von Bereichsbenutzer-Identifikationen;

eine Einrichtung (12) zum Eingeben von Bereichsbenutzer-Authentisierungscodes;

eine Authentisierungseinrichtung (2) zum Vergleichen einer Bereichsbenutzer-Identifikation und eines Authentisierungscodes, die jeweils von der genannten Eingabeeinrichtung (11, 12) eingegeben wurden, mit einer entsprechenden Bereichsbenutzer-Identifikation und einem Authentisierungscode, die in der genannten Tabellenspeichereinrichtung (5) gespeichert sind, um dadurch einen authentischen Benutzer zu bestimmen;

dadurch gekennzeichnet, daß:

die genannte Tabellenspeichereinrichtung (5) ferner bei der Ausgabe der genannten IC-Karte verwendbare Speicher-Bereichsgrößeninformationen speichert, die jedem Bereichsbenutzer-Authentisierungscode entsprechen und die Größe des Bereichs, dessen Benutzung durch den authentisierten Benutzer zulässig ist, repräsentieren;

und daß das System ferner umfaßt:

eine Benutzerbereichsgrößen-Berechnungseinrichtung (3) zum Berechnen einer verbleibenden Benutzerbereichsgröße für einen authentisierten Benutzer, der durch die genannte Authentisierungseinrichtung (2) authentisiert wird, auf Basis der verwendbaren Datenbereichsgrößeninformationen entsprechend dem genannten authentisierten Benutzer, die in der genannten Tabellenspeichereinrichtung (5) gespeichert sind, und der verwendeten Bereichsgröße, welche die Summe aller Bereichsgrößen bereits gebildeter Datenfelder in bezug auf die entsprechende Bereichsbenutzer-Identifikation repräsentiert;

eine Bereichsgrößenanforderungs-Eingabeeinrichtung (13) zum Empfangen einer Anforderung zur Erfassung eines Bereichs gegebener Größe in dem Datenfeld entsprechend einer Bereichsbenutzer-Identifikation; und

eine Datenfeldbereichserfassungseinrichtung (4), die von der genannten Bereichsgrößen-Berechnungseinrichtung (3) gesteuert wird, zum Erfassen und Bilden des angeforderten Bereichs in einem Leerbereich der IC-Karte unter der Bedingung, daß der genannte angeforderte Datenfeldbereich eine Größe aufweist, die kleiner oder gleich der genannten verbleibenden verwendbaren Bereichsgröße ist und kleiner oder gleich der Leerbereichsgröße der IC-Karte ist.

2. System nach Anspruch 1, bei welchem die genannteBereichsbenutzer-Authentisierungseinrichtung (2) durch Signale vom Bereichsbenutzer-Identifikations-Eingabeteil, der Authentisierungscode-Eingabeeinrichtung und der Tabellenspeichereinrichtung betrieben wird.

3. System nach Anspruch 1, bei welchem die genannte Bereichsgrößen-Berechnungseinrichtung (3) durch Signale von der Bereichsbenutzer-Authentisierungseinrichtung (2), der Bereichsgrößenanforderungs-Eingabeeinrichtung (13), der Tabellenspeichereinrichtung (5) und der Informationsspeichereinrichtung für entsprechende Datenfelder betrieben wird.

Revendications

1. Système destiné à permettre l'acquisition d'aires de champs de données dans une carte à circuit intégré pour services multiples, ledit système comprenant, au niveau de la carte à circuit intégré :

- une mémoire divisée en une pluralité de champs de données (80 à 83) servant à mémoriser des données ;

- un moyen de mémorisation sous forme de table (5) servant à mémoriser une pluralité d'identifications d'utilisateurs d'aires et des codes d'authentification d'utilisateurs d'aires correspondant aux identifications d'utilisateurs d'aires ;
- un moyen (11) d'entrée d'identification d'utilisateur d'aire ;
- un moyen (12) d'entrée de code d'authentification d'utilisateur d'aire ;
- un moyen d'authentification (2) servant à comparer une identification d'utilisateur d'aire et un code d'authentification, respectivement introduit par lesdits moyens d'entrée (11, 12), avec une identification d'utilisateur d'aire correspondante et un code d'authentification mémorisées dans ledit moyen de mémorisation sous forme de table (5), pour ainsi déterminer un utilisateur authentique ;

caractérisé en ce que :

ledit moyen de mémorisation sous forme de table (5) mémorise en outre, lors de la délivrance de ladite carte à circuit intégré, des informations de tailles d'aires de mémoire utilisables correspondant à chaque code d'authentification d'utilisateur d'aire et représentant la taille d'aire dont l'utilisation par l'utilisateur authentifié est autorisée ;

et en ce que le système comprend en outre :

- un moyen (3) de calcul de taille d'aire d'utilisateur servant à calculer la taille d'aire d'utilisateur restante pour un utilisateur authentifié qui a été authentifié par ledit moyen d'authentification (2), sur la base de l'information de taille d'aire utilisable correspondant audit utilisateur authentifié, emmagasinée dans ledit moyen de mémorisation sous forme de table (5) et de la taille d'aire utilisée représentant la somme des tailles des aires des champs de données déjà formés relative à l'identification d'utilisateur d'aire correspondante ;
- un moyen d'entrée de demande de taille d'aire (13) destiné à recevoir une demande pour l'acquisition d'une aire de taille donnée dans le champ de données correspondant à une identification d'utilisateur d'aire ; et
- un moyen d'acquisition d'aire de champ de données (4) commandé par ledit moyen de calcul de taille d'aire (3) et servant à acquérir et former l'aire demandée dans une aire vacante de la carte à circuit intégré à la condition que ladite aire de champ de données demandée ait une taille inférieure ou égale à ladite taille d'aire utilisable restante et inférieure ou égale à la taille d'aire vacante de la carte à circuit intégré.

2. Système selon la revendication 1, où le moyen d'authentification d'utilisateur d'aire (2) est activé par des signaux venant de la partie d'entrée d'identification d'utilisateur d'aire, du moyen d'entrée de code d'authentification, et du moyen de mémorisation sous forme de table.

3. Système selon la revendication 1, où ledit moyen de calcul de taille d'aire (3) est activé par des signaux venant du moyen d'authentification d'utilisateur d'aire (2), du moyen d'entrée de demande de taille d'aire (13), du moyen de mémorisation sous forme de table (5), et du moyen de mémorisation d'informations pour les champs de données respectifs.

Fig. 1

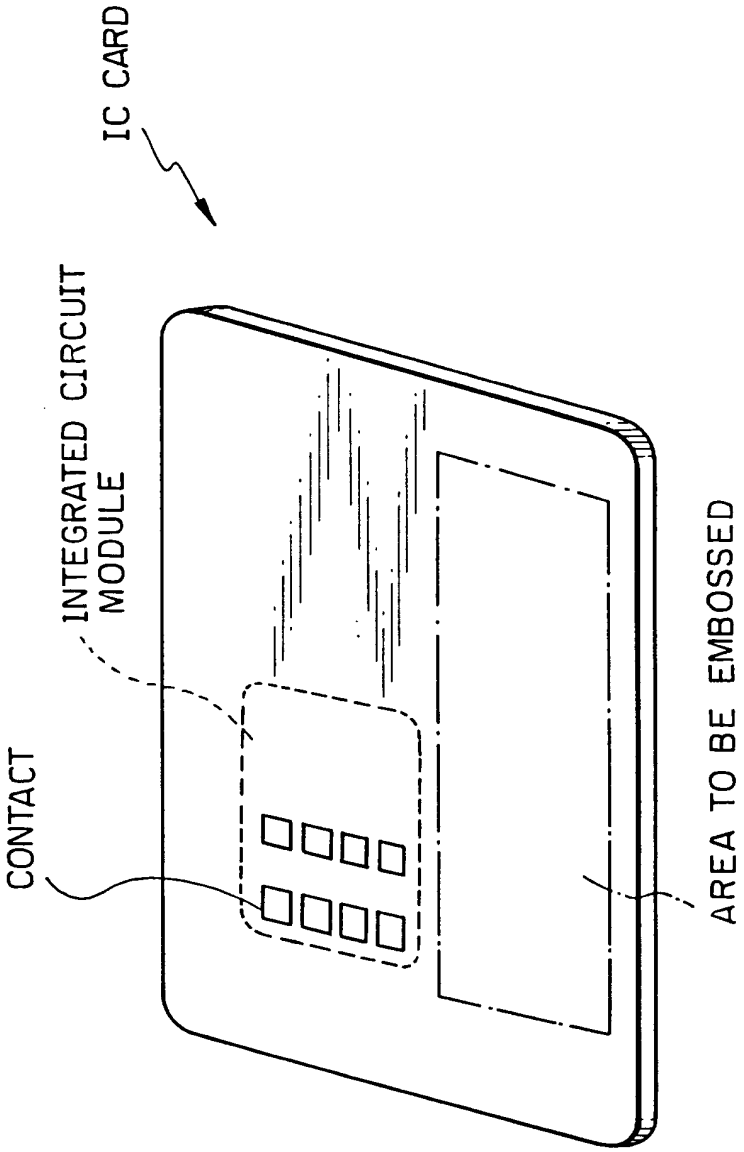

IC CARD
INTEGRATED CIRCUIT MODULE
CONTACT
AREA TO BE EMBOSSED

Fig. 2

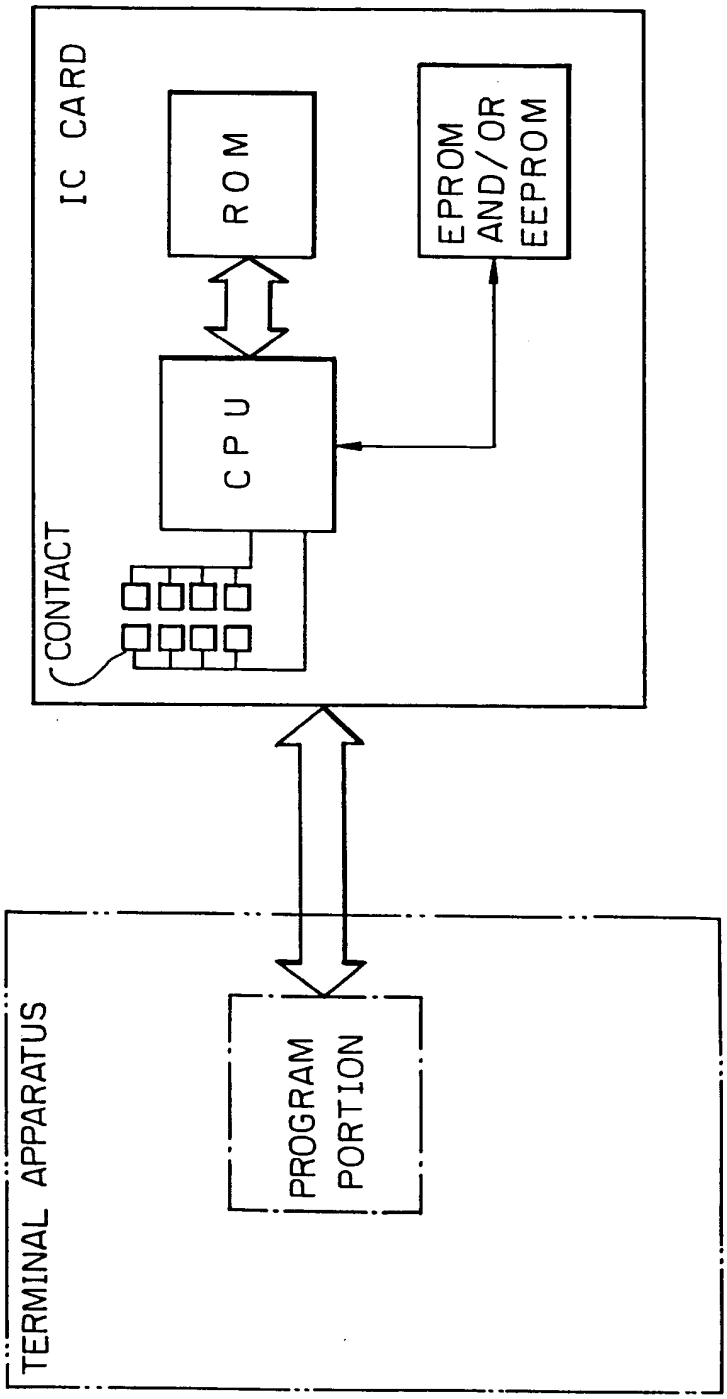

IC CARD
ROM
EPROM AND/OR EEPROM
CPU
CONTACT
TERMINAL APPARATUS
PROGRAM PORTION

Fig. 3

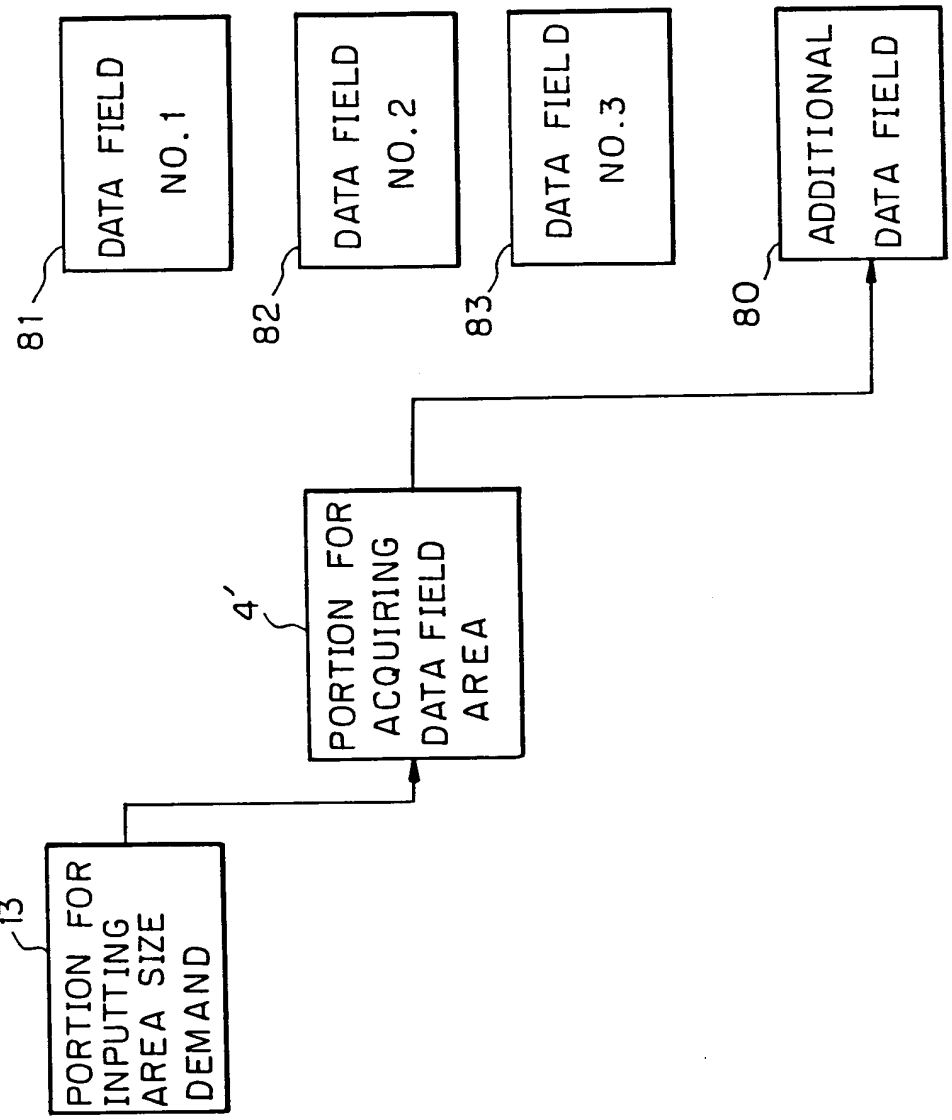

PORTION FOR INPUTTING AREA SIZE DEMAND
13'
PORTION FOR ACQUIRING DATA FIELD AREA
4'
DATA FIELD NO.1
81
DATA FIELD NO.2
82
DATA FIELD NO.3
83
ADDITIONAL DATA FIELD
80

Fig. 4

Fig. 4A	Fig. 4B

Fig. 4A

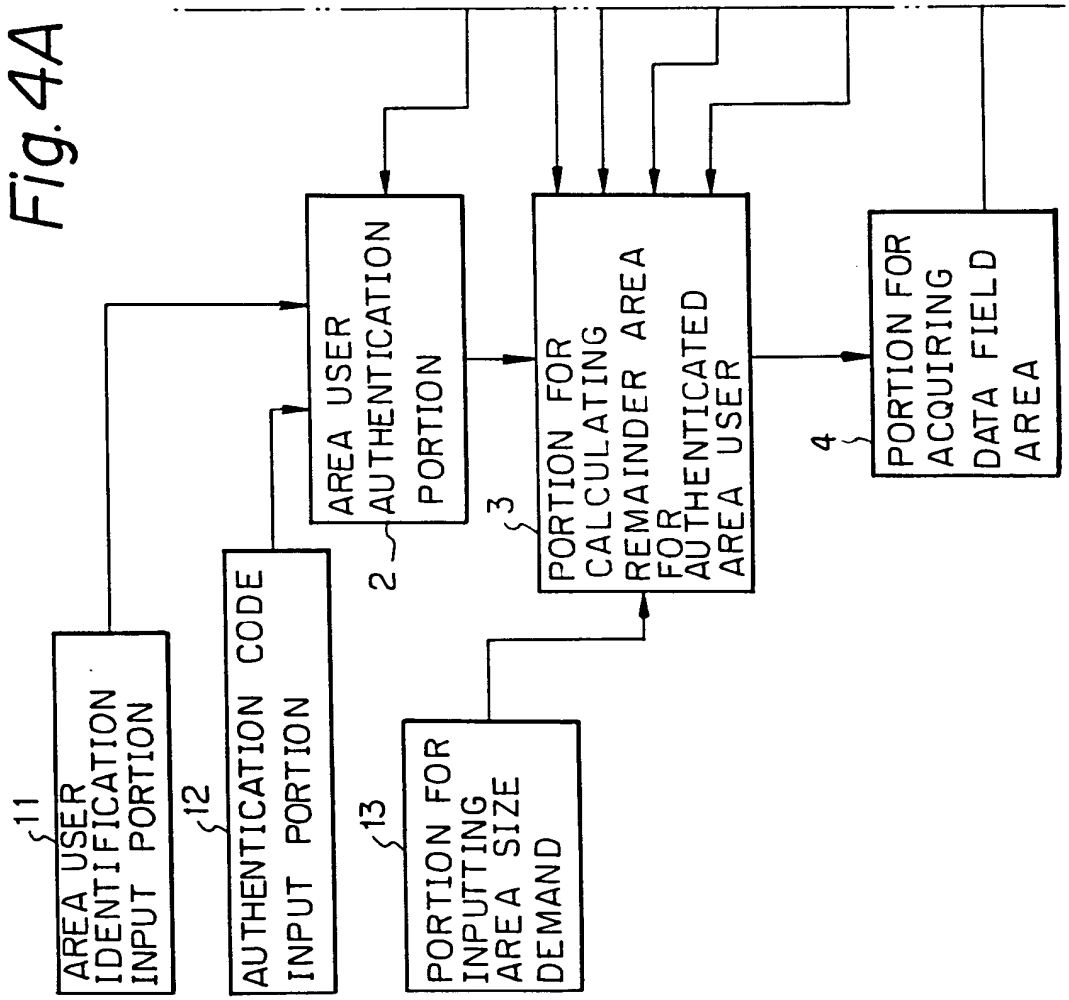


Fig. 4B

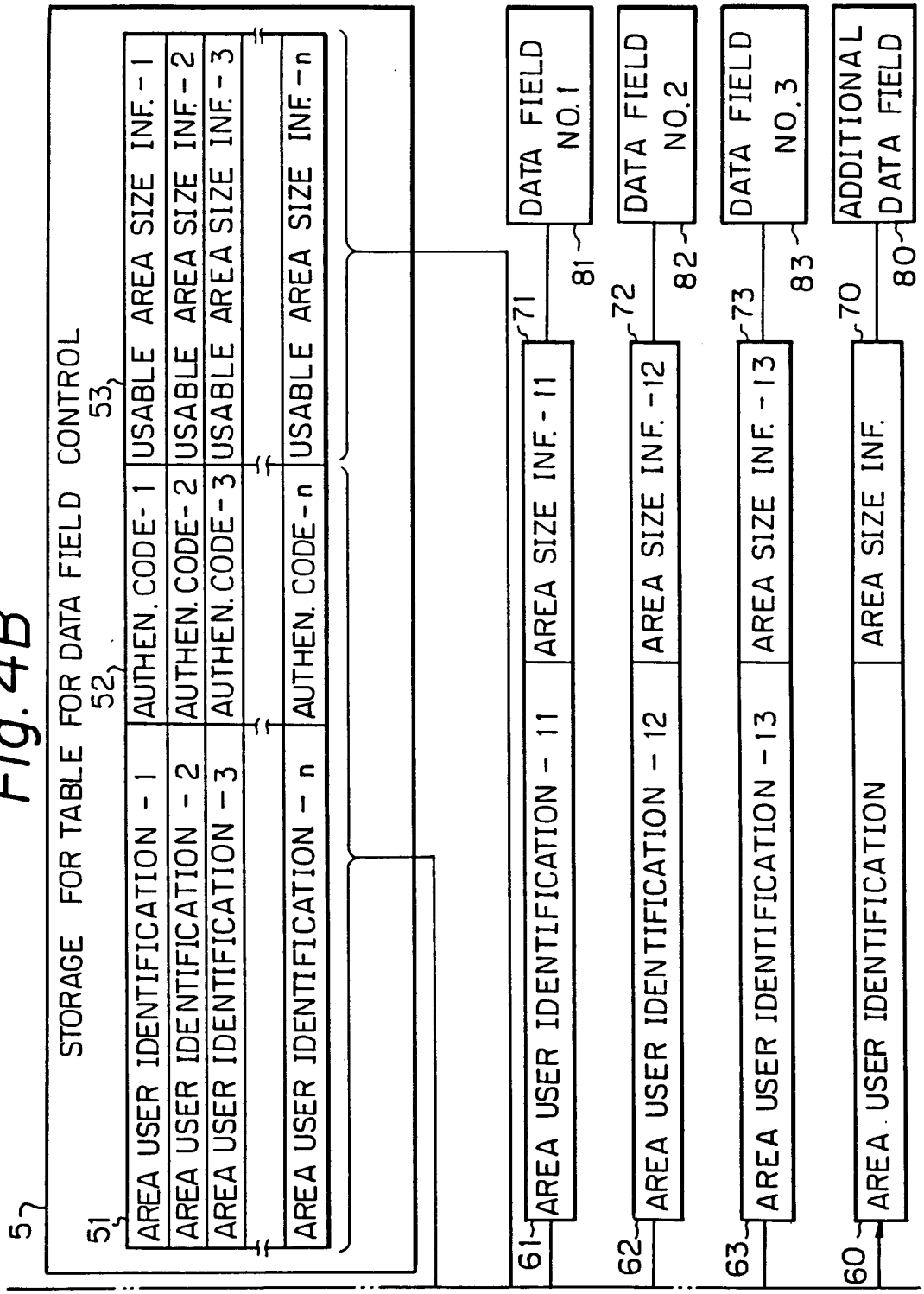

5
STORAGE FOR TABLE FOR DATA FIELD CONTROL
51
52
53
AREA USER IDENTIFICATION - 1
AUTHEN. CODE- 1
USABLE AREA SIZE INF. - 1
AREA USER IDENTIFICATION - 2
AUTHEN. CODE- 2
USABLE AREA SIZE INF. - 2
AREA USER IDENTIFICATION - 3
AUTHEN. CODE- 3
USABLE AREA SIZE INF. - 3
AREA USER IDENTIFICATION - n
AUTHEN. CODE- n
USABLE AREA SIZE INF. - n
61
AREA USER IDENTIFICATION - 11
AREA SIZE INF. - 11
71
DATA FIELD NO. 1
81
62
AREA USER IDENTIFICATION - 12
AREA SIZE INF. - 12
72
DATA FIELD NO. 2
82
63
AREA USER IDENTIFICATION - 13
AREA SIZE INF. - 13
73
DATA FIELD NO. 3
83
60
AREA USER IDENTIFICATION
AREA SIZE INF.
70
ADDITIONAL DATA FIELD
80

Fig. 5

Fig. 5A	Fig. 5B

Fig. 5A

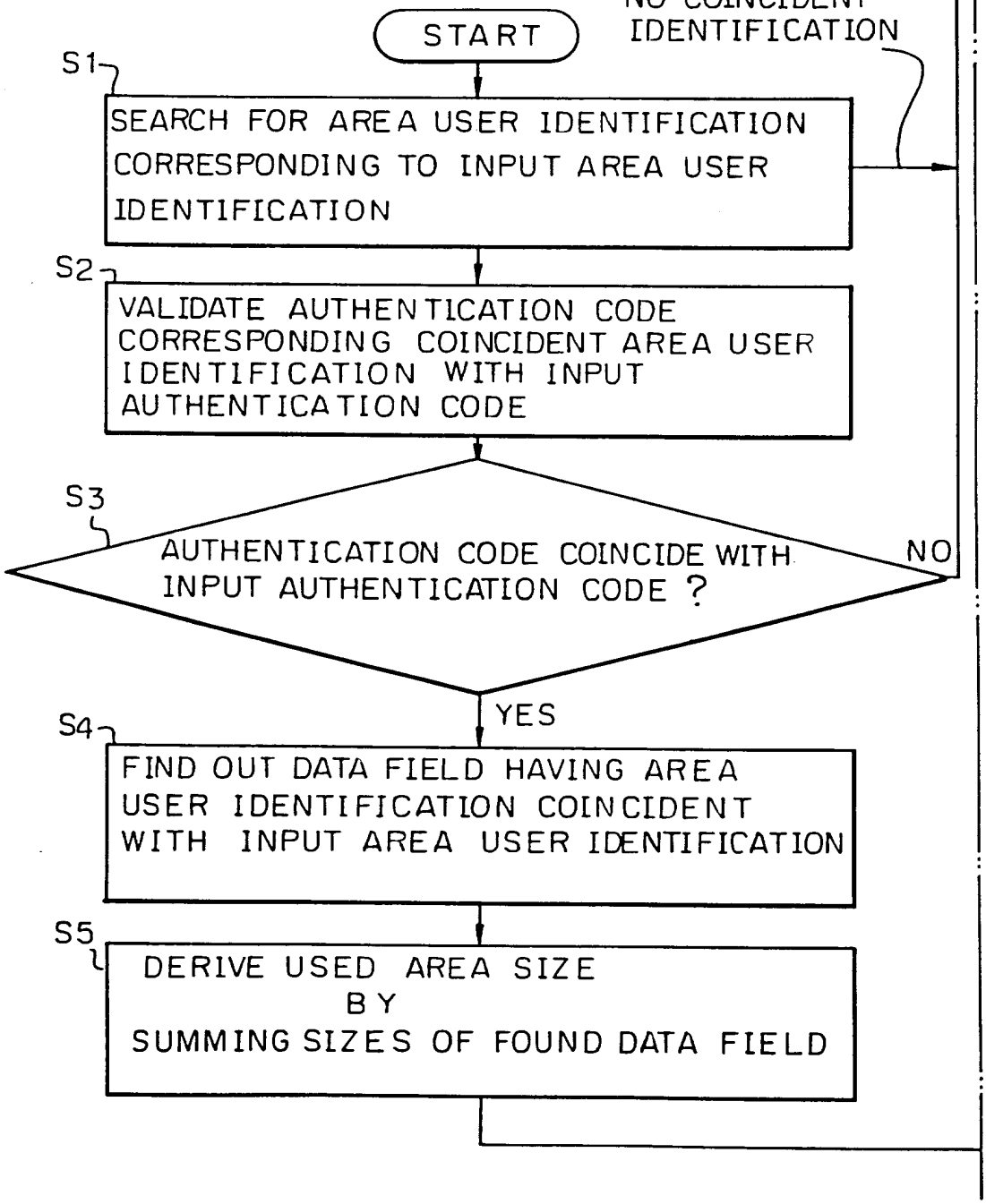


Fig. 5B

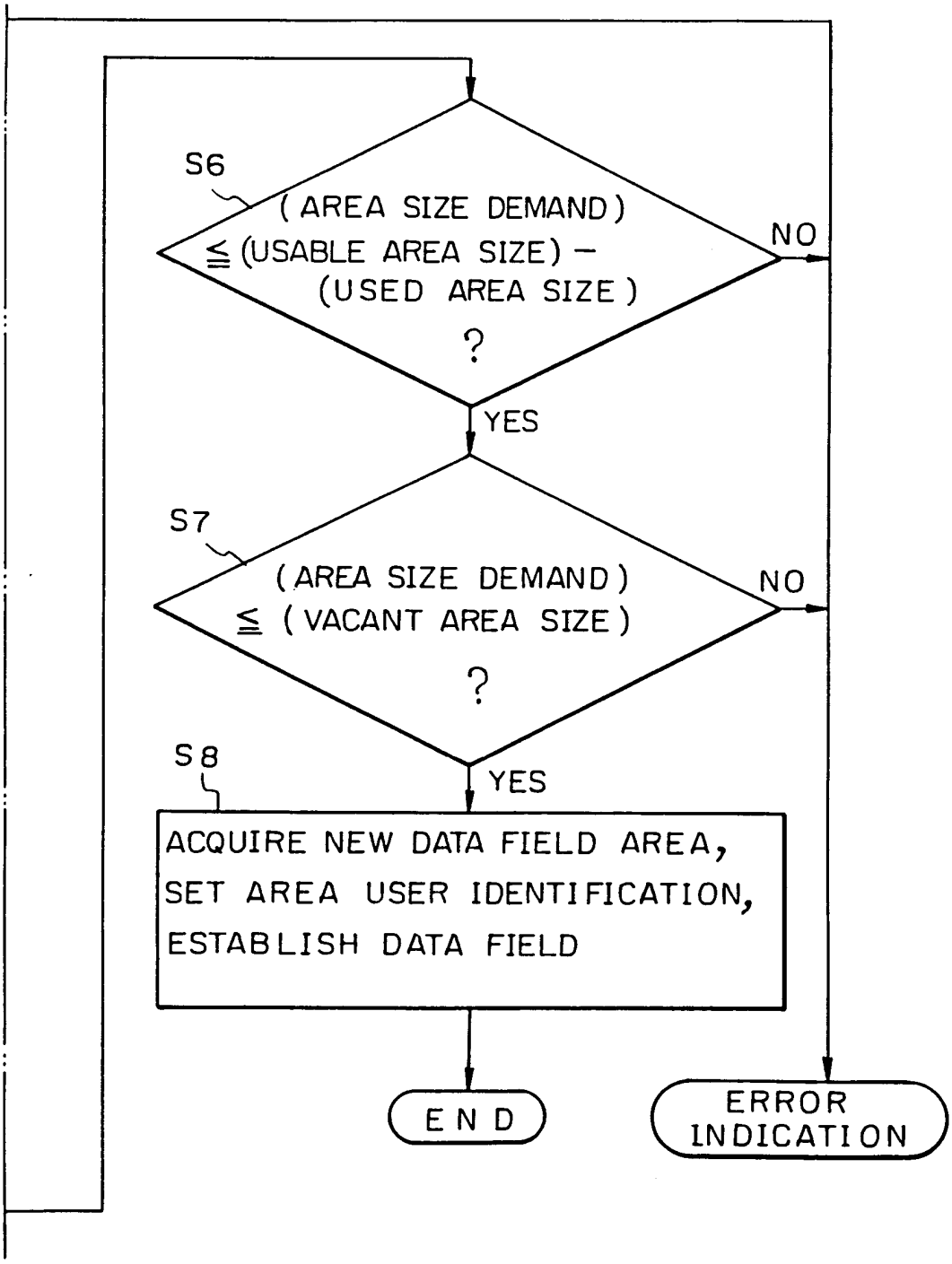
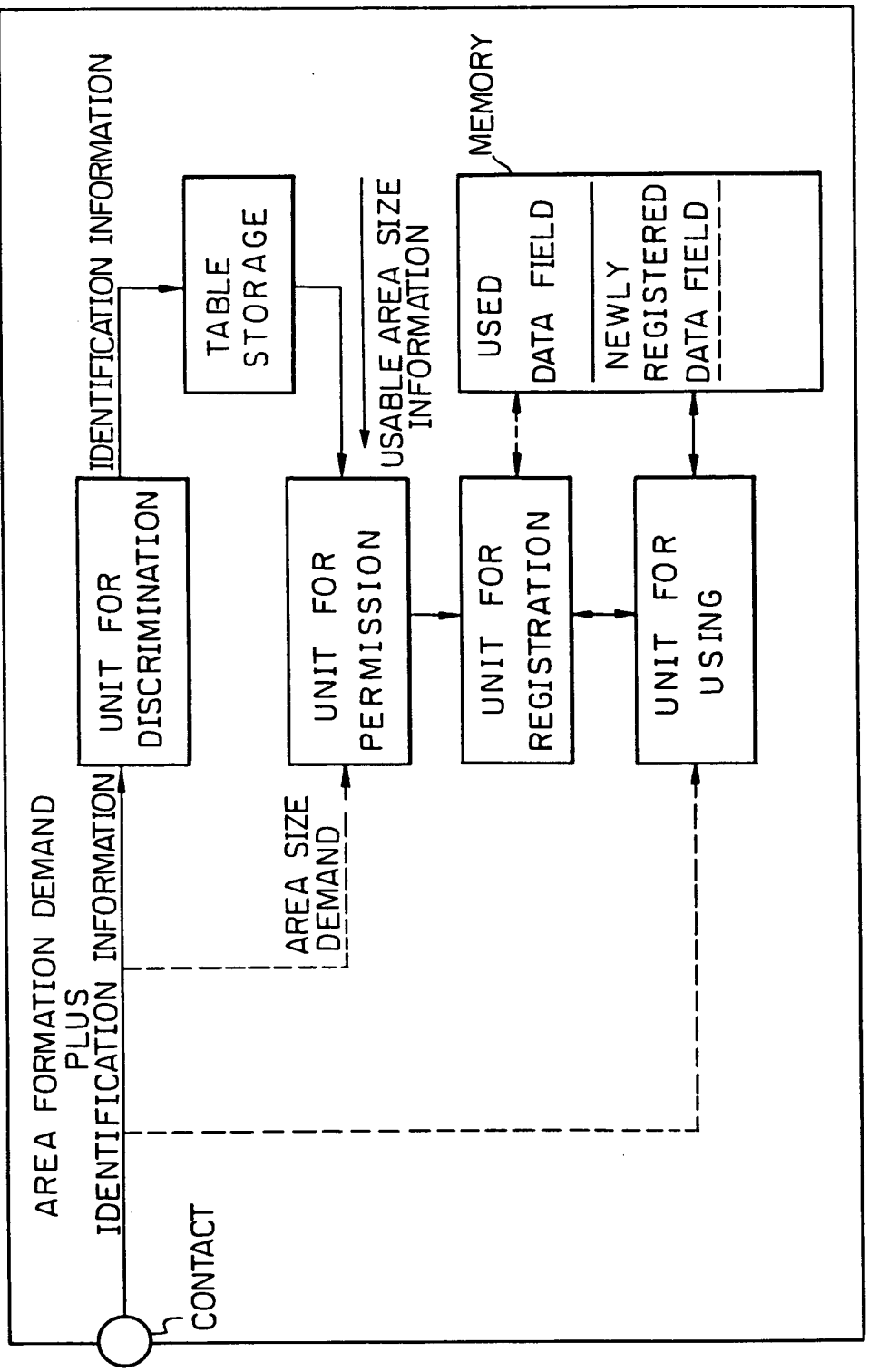

S6
(AREA SIZE DEMAND)
≦ (USABLE AREA SIZE) −
(USED AREA SIZE)
?
NO
YES
S7
(AREA SIZE DEMAND)
≦ (VACANT AREA SIZE)
?
NO
YES
S8
ACQUIRE NEW DATA FIELD AREA,
SET AREA USER IDENTIFICATION,
ESTABLISH DATA FIELD
END
ERROR INDICATION

Fig. 6


IC CARD
IDENTIFICATION INFORMATION
TABLE STORAGE
USABLE AREA SIZE INFORMATION
MEMORY
USED DATA FIELD
NEWLY REGISTERED DATA FIELD
UNIT FOR DISCRIMINATION
UNIT FOR PERMISSION
UNIT FOR REGISTRATION
UNIT FOR USING
AREA FORMATION DEMAND PLUS IDENTIFICATION INFORMATION
AREA SIZE DEMAND
CONTACT